

WHAT IS CLAIMED IS:

1. A method of forming an underfilled chip package, comprising:

5 depositing a no-flow underfill material over a surface of a package substrate to form an underfill region;

10 placing a die having a plurality of solder bumps at an angle relative to the package substrate such that one or more of the solder bumps adjacent a first side of the die contact the surface of the package substrate within the underfill region while one or more of the solder bumps adjacent a second side of the die opposite the first side of the die are generally located at a distance away from the surface of the package substrate; and

15 moving the second side of the die toward the surface of the package substrate until the one or more solder bumps adjacent the second side of the die contact the surface such that the underfill material is forced into the area between the plurality of bumps.

20 2. The method of Claim 1, further comprising performing a heated reflow process to connect the solder bumps to the surface of the packing substrate and to cure the underfill material.

25 3. The method of Claim 2, further comprising performing an additional heated reflow process to connect the packing substrate to a printed surface board.

4. The method of Claim 1, wherein moving the second side of the die toward the surface of the package substrate until the one or more solder bumps adjacent the second side of the die contact the surface causes the underfill material to flow generally in a direction from the first side of the die toward the second side of the die.

5. The method of Claim 1, wherein:
the underfill region is formed offset from the geometric center of the substrate in a first direction;
the die is placed in the geometric center of the substrate; and
moving the second side of the die toward the surface of the package substrate until the one or more solder bumps adjacent the second side of the die contact the surface causes the underfill material to flow generally in a second direction opposite the first direction.

6. The method of Claim 1, wherein moving the second side of the die toward the surface of the package substrate comprises rotating the die about the points of contact between the one or more solder bumps adjacent the first side of the die and the surface of the package substrate.

7. The method of Claim 1, further comprising moving the die in a first direction parallel with the surface of the package substrate simultaneous with moving the second side of the die toward the surface of the package substrate.

8. The method of Claim 7, wherein the first direction is a direction from the first side of the die toward the second side of the die when the solder bumps adjacent both the first and second sides of the die are
5 in contact with the surface of the package substrate.

9. The method of Claim 1, wherein the die is placed adjacent the package substrate using a vacuum nozzle.

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10. The method of Claim 1, wherein the chip package is a flip-chip package.

11. An underfilled chip package, comprising:

a substrate have a surface;

a die having a plurality of solder bumps attached thereto; and

5 a layer of no-flow underfill material disposed generally between the die and the substrate;

wherein the chip package is formed by:

10 depositing no-flow underfill material over the surface of the package substrate to form an underfill region;

placing the die at an angle relative to the package substrate such that one or more of the solder bumps adjacent a first side of the die contact the surface of the package substrate within the underfill region while one or more of the solder bumps adjacent a second side of the die opposite the first side of the die are generally located at a distance away from the surface of the package substrate; and

20 moving the second side of the die toward the surface of the package substrate until the one or more solder bumps adjacent the second side of the die contact the surface such that the underfill material is forced into the area between the plurality of bumps.

25 12. The chip package of Claim 11, wherein the chip package is further formed by performing a heated reflow process to connect the solder bumps to the surface of the packing substrate and to cure the underfill material.

13. The chip package of Claim 12, wherein the chip package is further formed by performing an additional heated reflow process to connect the packing substrate to a printed surface board.

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14. The chip package of Claim 11, wherein during the formation of the chip package, moving the second side of the die toward the surface of the package substrate until the one or more solder bumps adjacent the second side of the die contact the surface causes the underfill material to flow generally in a direction from the first side of the die toward the second side of the die.

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15. The chip package of Claim 11, wherein during the formation of the chip package,

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the underfill region is formed offset from the geometric center of the substrate in a first direction;

the die is placed in the geometric center of the substrate; and

moving the second side of the die toward the surface of the package substrate until the one or more solder bumps adjacent the second side of the die contact the surface causes the underfill material to flow generally in a second direction opposite the first direction.

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16. The chip package of Claim 11, wherein during the formation of the chip package, moving the second side of the die toward the surface of the package substrate comprises rotating the die about the points of contact between the one or more solder bumps adjacent the first side of the die and the surface of the package substrate.

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17. The chip package of Claim 11, wherein the chip package is further formed by moving the die in a first direction parallel with the surface of the package substrate simultaneous with moving the second side of the die toward the surface of the package substrate.

18. The chip package of Claim 17, wherein the first direction is a direction from the first side of the die toward the second side of the die when the solder bumps adjacent both the first and second sides of the die are in contact with the surface of the package substrate.

19. The chip package of Claim 11, wherein the underfilled chip package is an underfilled flip-chip package.

20. A method of forming an underfilled chip package, comprising:

depositing a no-flow underfill material over a surface of a package substrate to form an underfill region;

placing a die having a plurality of solder bumps at an angle relative to the package substrate such that one or more of the solder bumps adjacent a first side of the die contact the surface of the package substrate within the underfill region while one or more of the solder bumps adjacent a second side of the die opposite the first side of the die are generally located at a distance away from the surface of the package substrate; and

moving the second side of the die toward the surface of the package substrate by rotating the die about the points of contact between the one or more solder bumps adjacent the first side of the die and the surface of the package substrate until the one or more solder bumps adjacent the second side of the die contact the surface, wherein such rotation of the die causes at least a portion of the underfill material to flow generally in a direction from the first side of the die toward the second side of the die and into the area between the plurality of bumps; and

performing a heated reflow process to connect the solder bumps to the surface of the packing substrate and to cure the underfill material.